UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/737,542	12/14/2000	Robin R. Miles	IL-10406	9714

7590 03/22/2004

Alan H. Thompson
Assistant Laboratory Counsel
Lawrence Livermore National Laboratory
P.O. Box 808, L-703
Livermore, CA 94551

EXAMINER	
PADMANABHAN, KARTIC	
ART UNIT	PAPER NUMBER
1641	

DATE MAILED: 03/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/737,542	MILES ET AL.	
	Examiner	Art Unit	
	Kartic Padmanabhan	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on 2/20/04 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on Application No. 09/737,927 has been reviewed and is NOT accepted.

2. The terminal disclaimer does not comply with 37 CFR 1.321(b) and/or (c) because:

> The application/patent being disclaimed has been improperly identified since the number used to identify the application being disclaimed is incorrect. The correct number is 09/738,927.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 10-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 10, 16, and 24 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are the way in which the beads coated with antibodies that stick to the pathogens are related to the other components of the device.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 10, 12-18, and 21-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Gerwen et al. (WO 97/21094) in view of Nelson et al. (US Pat. 6,074,827).

Van Gerwen et al. teach an impedimetric detection system comprising an insulating layer with a plurality of interspersed channels therein. A metal coating is applied to one of the two opposite side walls of each channel and on top of the dielectric layer in between said channels, thereby forming an impedimetric device. Probes are applied to either the insulating part of the channels or to the surface of the electrodes or both (abstract). The device also comprises means

for applying a voltage on the metal coatings and measuring the impedance between the electrodes. The sensor of the reference also has an interdigitated electrode structure (page 10, lines 10-16 and page 15, line 28). The probes of the device include antibodies (page 5 and figures 1-7). When an electric signal is applied (voltage or current), an electric field arises. If the analyte is present in the solution tested, it will be bound to the probe on the electrode surface, resulting in a change in impedance, which is then quantified (page 15). It is inherent that the means for producing the electric field is an AC or DC power supply. However, the reference does not teach pairs of electrodes located on the same surface and/or same side of the microchannel or on a bottom surface of the channel, nor does it teach antibody-coated beads.

Nelson et al. teach microfluidic purification and separation methods, wherein beads coated with antibodies specific for the analyte of interest are used to bind the target analyte and separate it from the rest of the sample (Col. 6, lines 30-45).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to place the electrode pair on the same side of the microchannel, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. In addition, the placement of the electrodes on a bottom surface of the microchannel would have been obvious because it simply represents an optimization of the device or a rearrangement of the parts of the device, which one would have had a reasonable expectation of success in using. In addition, it would have been obvious to use the antibody-coated beads of Nelson et al. with the device of Van Gerwen et al. because Nelson teaches the use of these coated beads in fluidic systems having channels, and the use of these beads to bind the pathogens of

Van Gerwen would allow for an even more noticeable difference in the impedance measurements between when pathogen is present and when it is not.

10. Claims 10, 12-13, 16, and 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clark et al. (US Pat. 5,194,133) in view of Kipling et al. (US Pat. 5,374,521) and Nelson et al. (US Pat. 6,074,827).

Clark et al. teach sensor devices comprising pairs of sensing electrodes that are spaced apart along the walls of a channel that has been micromachined in a surface of a substrate (abstract). The channel walls may be coated with a biological substance, such as an enzyme (col. 1). The electrodes may be amperometric enzyme electrodes (Col. 3, lines 48-50). The sensors of the reference may be used to measure impedance between electrodes (col. 5, lines 50-55). A DC pulse may be used generate the electric field (col. 5, lines 60-65). The reference also teaches a plurality of signal generators and a plurality of amplifier/mixer assemblies (Figure 6). The reference does not teach antibodies located on the electrodes.

Kipling et al. teach a sensor comprising a pair of spaced electrodes that may both have a coating attached thereto (col. 1). A receptor will be attached to the coating on the electrodes, and the receptor may any biomolecule, including antibodies (col. 5). A voltage is applied between the electrodes, which makes it inherent that there is a means for applying this voltage to create an electric field (col. 3). The impedance between the electrodes is one of the parameters that can be determined with the sensor of the reference (col. 5). It is further inherent that the electric field is produced by an AC or DC power supply because these power supplies are generally used to apply voltages at various frequencies. However, the reference does not teach antibody-coated beads.

Nelson et al. teach microfluidic purification and separation methods, wherein beads coated with antibodies specific for the analyte of interest are used to bind the target analyte and separate it from the rest of the sample (Col. 6, lines 30-45).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use the antibodies on the surfaces of the electrode as taught by Kipling et al. with the device of Clark et al. because Kipling teaches that any number of biomolecules can be used on the electrode surface. Therefore, depending on the analyte one wishes to detect, one would have known that a number of receptors could have been placed on the electrodes of Clark et al. with a reasonable expectation of success. In addition, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to place the electrode pair on the same side of the microchannel, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. Also, the placement of the electrodes on a bottom surface of the microchannel would have been obvious because it simply represents an optimization of the device or a rearrangement of the parts of the device, which one would have had a reasonable expectation of success in using. It would have further been obvious to use the antibody-coated beads of Nelson et al. with the modified device of Clark et al. and Kipling et al. because Nelson teaches the use of these coated beads in fluidic systems having channels, and the use of these beads to bind the pathogens of interest would allow for an even more noticeable difference in the impedance measurements between when pathogen is present and when it is not.

11. Claims 11, 14, 17-19, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clark et al. (US Pat. 5,194,133) in view of Kipling et al. (US Pat. 5,374,521)

and Nelson et al. (US Pat. 6,074,827) as applied to claims 10, 12-13, 16, and 20-21 above, and further in view of Taylor et al. (US Pat. 5,001,048).

Clark et al., Kipling et al., and Nelson et al. teach sensor devices, as discussed above. However, the references do not teach the use of reference electrodes or an interdigitated electrode assembly.

Taylor et al. teach an electrical biosensor for analyte determination. In one embodiment, a single chip design is used, wherein the transducer is a quartz or glass substrate containing two terminal interdigitated electrodes. A receptor (which may be an antibody) containing membrane is in contact with the electrodes. A current is applied across the electrodes creating an electric field, such that a change in impedance results upon binding of an analyte to its receptor. The impedance is measured and is indicative of analyte concentration in the sample. In another embodiment, a double chip design may be used. This biosensor includes a non-receptor (reference) membrane and a receptor containing membrane, wherein the membranes are attached to different electrode surfaces, and impedance measured from control membrane is considered as a background signal. A barrier, which may be comprised of an insulator, is located between the reference and receptor-containing electrode to inhibit current flow between the two surfaces. It is once again inherent that the power supply is AC or DC.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use the reference electrodes and insulating layer, as well as the interdigitated electrode assembly of Taylor et al. with the modified sensor of Clark et al., Kipling et al., and Nelson et al. One would have been motivated to use a reference electrode in an insulating layer to determine a background signal, wherein a difference from background can be used as an

indication of the analyte of interest. Further, an insulator provides the advantage of preventing current flow between the reference electrode and sensor electrode, which results in a contamination of assay results. It would have also been obvious to use an interdigitated electrode assembly because Clark et al. state that a number of electrode configurations can be used with the device of their reference. Further, the configuration depicted in figure 4 of the reference resembles an interdigitated assembly, and one would expect such a configuration to work with their sensor.

12. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clark et al. (US Pat. 5,194,133) in view of Kipling et al. (US Pat. 5,374,521) and Nelson et al. (US Pat. 6,074,827) as applied to claims 10, 12-13, 16, and 20-21 above, and further in view of Stetter et al. (US Pat. 5,567,301).

Clark et al., Kipling et al., and Nelson et al. teach sensor devices, as discussed above. However, the references do not teach the use of an AC source.

Stetter et al. teach a biosensor comprising two spaced metal electrodes, wherein at least one antibody is disposed on and/or between the two electrodes. The sensor also comprises impedance detection means for measuring the impedance between the two electrodes (cols. 3-4). Since figure 2 shows the impedance as a function of the AC frequency, the presence of an AC power source for the production of an electric field across the electrodes is inherent.

It would have been *prima facie* obvious to use the AC power source of Stetter et al. with the sensor of Clark et al., Kipling et al., and Nelson et al. because the use of AC impedance is very well known in the art, and one would have known that an AC source could have easily been substituted for the DC source of Clark et al. with a reasonable expectation of success.

13. Claims 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over van Gerwen et al. (WO 97/21094) and Nelson et al. (US Pat. 6,074,827) as applied to claims 10, 12-18, and 21-28 above, and further in view of Taylor et al. (US Pat. 5,374,521).

Van Gerwen et al. and Nelson et al. teach a sensor device, as previously discussed. However, the references do not teach reference electrodes or insulation.

Taylor et al. teach an electrical biosensor for analyte determination. In one embodiment, a single chip design is used, wherein the transducer is a quartz or glass substrate containing two terminal interdigitated electrodes. A receptor (which may be an antibody) containing membrane is in contact with the electrodes. A current is applied across the electrodes creating an electric field, such that a change in impedance results upon binding of an analyte to its receptor. The impedance is measured and is indicative of analyte concentration in the sample. In another embodiment, a double chip design may be used. This biosensor includes a non-receptor (reference) membrane and a receptor containing membrane, wherein the membranes are attached to different electrode surfaces, and impedance measured from control membrane is considered as a background signal. A barrier, which may be comprised of an insulator, is located between the reference and receptor-containing electrode to inhibit current flow between the two surfaces. It is once again inherent that the power supply is AC or DC.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use the reference electrodes and insulating layer of Taylor et al. with the modified sensor of Van Gerwen et al. and Nelson et al. because the use of a reference electrode in an insulating layer allows the determination of a background signal, wherein a difference from background can be used as an indication of the analyte of interest. Further, an insulator provides

the advantage of preventing current flow between the reference electrode and sensor electrode, which results in a contamination of assay results.

14. Claims 10-28 are rejected under 35 U.S.C. 103(a) as being obvious over Krulevitch et al. (US Pat. 6,437,551 B1) in view of Kipling et al. (US Pat. 5,374,521) and Nelson et al. (US Pat. 6,074,827).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Krulevitch et al. teach a device comprising at least one fluidic channel, at least one pair of spaced electrodes positioned in the surface of the channel, an AC power source for applying a

voltage across the electrodes, and means for measuring the impedance between electrodes. The device also comprises reference electrodes. However, the reference does not teach antibodies immobilized on the electrodes.

Kipling et al. teach a sensor comprising a pair of spaced electrodes that may both have a coating attached thereto (col. 1). A receptor will be attached to the coating on the electrodes, and the receptor may any biomolecule, including antibodies (col. 5). A voltage is applied between the electrodes, which makes it inherent that there is a means for applying this voltage to create an electric field (col. 3). The impedance between the electrodes is one of the parameters that can be determined with the sensor of the reference (col. 5). It is further inherent that the electric field is produced by an AC or DC power supply because these power supplies are generally used to apply voltages at various frequencies. However, the reference does not teach the use of antibody-coated beads.

Nelson et al. teach microfluidic purification and separation methods, wherein beads coated with antibodies specific for the analyte of interest are used to bind the target analyte and separate it from the rest of the sample (Col. 6, lines 30-45).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use the antibodies on the surfaces of the electrode as taught by Kipling et al. with the device of Krulevitch et al. because Kipling teaches that any number of biomolecules can be used on the electrode surface. Therefore, depending on the analyte one wishes to detect, one would have known that a number of receptors could have been placed on the electrodes of Krulevitch et al. with a reasonable expectation of success. In addition, it would have been obvious to use the antibody-coated beads of Nelson et al. with the modified device of Krulevitch

et al. and Kipling et al. because Nelson teaches the use of these coated beads in fluidic systems having channels, and the use of these beads to bind the target pathogens would allow for an even more noticeable difference in the impedance measurements between when pathogen is present and when it is not.

Double Patenting

15. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

16. Claims 10-28 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 10-21 of copending Application No. 09/993,870 (US 2002/0150886 A1). Although the conflicting claims are not

identical, they are not patentably distinct from each other because both sets of claims recite devices for determining the trapping of pathogens by antibodies deposited in a fluidic channel comprising a fluidic channel having at least one pair of spaced electrodes, antibodies located on the spaced electrodes, means for producing an electric field across the spaced electrodes, and an impedance sensor for measuring the impedance between the electrodes, and one of ordinary skill in the art would recognize that the two sets of claims read on one another and are thus not patentably distinct.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

17. Claims 10-28 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-11 of copending Application No. 09/738,927 (US 2002/0070114 A1) in view of Kipling et al. (US Pat. 5,374,521) and Nelson et al. (US Pat. 6,074,827).

Miles teaches a device for detecting the presence of pathogens trapped in an electric field, comprising a fluidic channel, at least one pair of interdigitated electrodes positioned in the surface of the channel, an AC power source for applying a voltage across the electrodes, and means for measuring the impedance between electrodes as an indication of pathogen presence. The device also comprises a plurality of signal generators, amplifiers and mixers. However, the reference does not teach antibodies immobilized on the electrodes (See claims).

Kipling et al. teach a sensor comprising a pair of spaced electrodes that may both have a coating attached thereto (col. 1). A receptor will be attached to the coating on the electrodes, and the receptor may any biomolecule, including antibodies (col. 5). A voltage is applied between the

electrodes, which makes it inherent that there is a means for applying this voltage to create an electric field (col. 3). The impedance between the electrodes is one of the parameters that can be determined with the sensor of the reference (col. 5). It is further inherent that the electric field is produced by an AC or DC power supply because these power supplies are generally used to apply voltages at various frequencies. However, the reference does not teach the use of antibody-coated beads.

Nelson et al. teach microfluidic purification and separation methods, wherein beads coated with antibodies specific for the analyte of interest are used to bind the target analyte and separate it from the rest of the sample (Col. 6, lines 30-45).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use the antibodies on the surfaces of the electrode as taught by Kipling et al. with the device of Miles because Kipling teaches that any number of biomolecules can be used on the electrode surface. Therefore, depending on the analyte one wishes to detect, one would have known that a number of receptors could have been placed on the electrodes of Miles with a reasonable expectation of success. In addition, it would have been obvious to use the antibody-coated beads of Nelson et al. with the modified device of Miles et al. and Kipling et al. because Nelson teaches the use of these coated beads in fluidic systems having channels, and the use of these beads to bind the target pathogens would allow for an even more noticeable difference in the impedance measurements between when pathogen is present and when it is not.

This is a provisional obviousness-type double patenting rejection.

18. Claims 10-28 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-22 of U.S. Patent No. 6,437,551 B1 in view of Kipling et al. (US Pat. 5,374,521) and Nelson et al. (US Pat. 6,074,827).

Krulevitch et al. teach a device comprising at least one fluidic channel, at least one pair of spaced electrodes positioned in the surface of the channel, an AC power source for applying a voltage across the electrodes, and means for measuring the impedance between electrodes. The device also comprises reference electrodes. However, the reference does not teach antibodies immobilized on the electrodes.

Kipling et al. teach a sensor comprising a pair of spaced electrodes that may both have a coating attached thereto (col. 1). A receptor will be attached to the coating on the electrodes, and the receptor may any biomolecule, including antibodies (col. 5). A voltage is applied between the electrodes, which makes it inherent that there is a means for applying this voltage to create an electric field (col. 3). The impedance between the electrodes is one of the parameters that can be determined with the sensor of the reference (col. 5). It is further inherent that the electric field is produced by an AC or DC power supply because these power supplies are generally used to apply voltages at various frequencies. However, the reference does not teach the use of antibody-coated beads.

Nelson et al. teach microfluidic purification and separation methods, wherein beads coated with antibodies specific for the analyte of interest are used to bind the target analyte and separate it from the rest of the sample (Col. 6, lines 30-45).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to use the antibodies on the surfaces of the electrode as taught by Kipling et al.

with the device of Krulevitch et al. because Kipling teaches that any number of biomolecules can be used on the electrode surface. Therefore, depending on the analyte one wishes to detect, one would have known that a number of receptors could have been placed on the electrodes of Krulevitch et al. with a reasonable expectation of success. In addition, it would have been obvious to use the antibody-coated beads of Nelson et al. with the modified device of Krulevitch et al. and Kipling et al. because Nelson teaches the use of these coated beads in fluidic systems having channels, and the use of these beads to bind the target pathogens would allow for an even more noticeable difference in the impedance measurements between when pathogen is present and when it is not.

Response to Arguments

19. Applicant's arguments with respect to claims 10-28 have been considered but are moot in view of the new ground(s) of rejection. Applicant has argued that the references did not teach beads coated with antibodies; however, Nelson et al. has not been relied upon to cure this deficiency. In addition, the 103 rejection over Miles has been withdrawn due to applicant's statement of a common assignees between the reference and the present application; however, a similar statement was not made with regards to the Krulevitch reference. Further, all the double patenting rejections have been maintained. Applicant only attempted to disclaim one copending application, but the terminal disclaimer was ineffective as it identified the wrong application.

Conclusion

Claims 10-28 are rejected.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kartic Padmanabhan whose telephone number is 571-272-0825. The examiner can normally be reached on M-F (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kartic Padmanabhan
Patent Examiner
Art Unit 1641
***

LONG V. LE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600